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NOTICE OF ALLOWANCE AND FEE(S) DUE

22428 7590 08/28/2009

FOLEY AND LARDNER LLP
SUITE 500
3000 K STREET NW
WASHINGTON, DC 20007

EXAMINER

RUGGLES, JOHN S

ART UNIT

PAPER NUMBER

1795

DATE MAILED: 08/28/2009

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/689,547	10/21/2003	Percy Van Crocker	083847-0198	9313

TITLE OF INVENTION: METHODS FOR ADDITIVE REPAIR OF PHASE SHIFT MASKS BY SELECTIVELY DEPOSITING NANOMETER-SCALE ENGINEERED STRUCTURES ON DEFECTIVE PHASE SHIFTERS

APPLN. TYPE	SMALL ENTITY	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	NO	\$1510	\$300	\$0	\$1810	11/30/2009

THE APPLICATION IDENTIFIED ABOVE HAS BEEN EXAMINED AND IS ALLOWED FOR ISSUANCE AS A PATENT. **PROSECUTION ON THE MERITS IS CLOSED.** THIS NOTICE OF ALLOWANCE IS NOT A GRANT OF PATENT RIGHTS. THIS APPLICATION IS SUBJECT TO WITHDRAWAL FROM ISSUE AT THE INITIATIVE OF THE OFFICE OR UPON PETITION BY THE APPLICANT. SEE 37 CFR 1.313 AND MPEP 1308.

THE ISSUE FEE AND PUBLICATION FEE (IF REQUIRED) MUST BE PAID WITHIN **THREE MONTHS FROM THE MAILING DATE OF THIS NOTICE** OR THIS APPLICATION SHALL BE REGARDED AS ABANDONED. **THIS STATUTORY PERIOD CANNOT BE EXTENDED.** SEE 35 U.S.C. 151. THE ISSUE FEE DUE INDICATED ABOVE DOES NOT REFLECT A CREDIT FOR ANY PREVIOUSLY PAID ISSUE FEE IN THIS APPLICATION. IF AN ISSUE FEE HAS PREVIOUSLY BEEN PAID IN THIS APPLICATION (AS SHOWN ABOVE), THE RETURN OF PART B OF THIS FORM WILL BE CONSIDERED A REQUEST TO REAPPLY THE PREVIOUSLY PAID ISSUE FEE TOWARD THE ISSUE FEE NOW DUE.

HOW TO REPLY TO THIS NOTICE:

I. Review the SMALL ENTITY status shown above.

If the SMALL ENTITY is shown as YES, verify your current SMALL ENTITY status:

A. If the status is the same, pay the TOTAL FEE(S) DUE shown above.

B. If the status above is to be removed, check box 5b on Part B - Fee(s) Transmittal and pay the PUBLICATION FEE (if required) and twice the amount of the ISSUE FEE shown above, or

If the SMALL ENTITY is shown as NO:

A. Pay TOTAL FEE(S) DUE shown above, or

B. If applicant claimed SMALL ENTITY status before, or is now claiming SMALL ENTITY status, check box 5a on Part B - Fee(s) Transmittal and pay the PUBLICATION FEE (if required) and 1/2 the ISSUE FEE shown above.

II. PART B - FEE(S) TRANSMITTAL, or its equivalent, must be completed and returned to the United States Patent and Trademark Office (USPTO) with your ISSUE FEE and PUBLICATION FEE (if required). If you are charging the fee(s) to your deposit account, section "4b" of Part B - Fee(s) Transmittal should be completed and an extra copy of the form should be submitted. If an equivalent of Part B is filed, a request to reapply a previously paid issue fee must be clearly made, and delays in processing may occur due to the difficulty in recognizing the paper as an equivalent of Part B.

III. All communications regarding this application must give the application number. Please direct all communications prior to issuance to Mail Stop ISSUE FEE unless advised to the contrary.

IMPORTANT REMINDER: Utility patents issuing on applications filed on or after Dec. 12, 1980 may require payment of maintenance fees. It is patentee's responsibility to ensure timely payment of maintenance fees when due.

PART B - FEE(S) TRANSMITTAL

Complete and send this form, together with applicable fee(s), to: **Mail** **Mail Stop ISSUE FEE**
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INSTRUCTIONS: This form should be used for transmitting the ISSUE FEE and PUBLICATION FEE (if required). Blocks 1 through 5 should be completed where appropriate. All further correspondence including the Patent, advance orders and notification of maintenance fees will be mailed to the current correspondence address as indicated unless corrected below or directed otherwise in Block 1, by (a) specifying a new correspondence address; and/or (b) indicating a separate "FEE ADDRESS" for maintenance fee notifications.

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I hereby certify that this Fee(s) Transmittal is being deposited with the United States Postal Service with sufficient postage for first class mail in an envelope addressed to the Mail Stop ISSUE FEE address above, or being facsimile transmitted to the USPTO (571) 273-2885, on the date indicated below.

(Depositor's name)
(Signature)
(Date)

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/689,547 10/21/2003 Percy Van Crocker 083847-0198 9313

TITLE OF INVENTION: METHODS FOR ADDITIVE REPAIR OF PHASE SHIFT MASKS BY SELECTIVELY DEPOSITING NANOMETER-SCALE ENGINEERED STRUCTURES ON DEFECTIVE PHASE SHIFTERS

APPLN. TYPE	SMALL ENTITY	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	NO	\$1510	\$300	\$0	\$1810	11/30/2009

EXAMINER	ART UNIT	CLASS-SUBCLASS
RUGGLES, JOHN S	1795	430-005000

1. Change of correspondence address or indication of "Fee Address" (37 CFR 1.363).

- ☐ Change of correspondence address (or Change of Correspondence Address form PTO/SB/122) attached.
☐ "Fee Address" indication (or "Fee Address" Indication form PTO/SB/47; Rev 03-02 or more recent) attached. Use of a **Customer Number is required.**

2. For printing on the patent front page, list

- (1) the names of up to 3 registered patent attorneys or agents OR, alternatively, 1 _____
 (2) the name of a single firm (having as a member a registered attorney or agent) and the names of up to 2 registered patent attorneys or agents. If no name is listed, no name will be printed. 2 _____
 3 _____

3. ASSIGNEE NAME AND RESIDENCE DATA TO BE PRINTED ON THE PATENT (print or type)

PLEASE NOTE: Unless an assignee is identified below, no assignee data will appear on the patent. If an assignee is identified below, the document has been filed for recordation as set forth in 37 CFR 3.11. Completion of this form is NOT a substitute for filing an assignment.

(A) NAME OF ASSIGNEE

(B) RESIDENCE: (CITY and STATE OR COUNTRY)

Please check the appropriate assignee category or categories (will not be printed on the patent): ☐ Individual ☐ Corporation or other private group entity ☐ Government

4a. The following fee(s) are submitted:

- ☐ Issue Fee
☐ Publication Fee (No small entity discount permitted)
☐ Advance Order - # of Copies _____

4b. Payment of Fee(s): (Please first reapply any previously paid issue fee shown above)

- ☐ A check is enclosed.
☐ Payment by credit card. Form PTO-2038 is attached.
☐ The Director is hereby authorized to charge the required fee(s), any deficiency, or credit any overpayment, to Deposit Account Number _____ (enclose an extra copy of this form).

5. **Change in Entity Status** (from status indicated above)

- ☐ a. Applicant claims SMALL ENTITY status. See 37 CFR 1.27. ☐ b. Applicant is no longer claiming SMALL ENTITY status. See 37 CFR 1.27(g)(2).

NOTE: The Issue Fee and Publication Fee (if required) will not be accepted from anyone other than the applicant; a registered attorney or agent; or the assignee or other party in interest as shown by the records of the United States Patent and Trademark Office.

Authorized Signature _____ Date _____
 Typed or printed name _____ Registration No. _____

This collection of information is required by 37 CFR 1.311. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, Virginia 22313-1450. **DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, Virginia 22313-1450.**

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Determination of Patent Term Adjustment under 35 U.S.C. 154 (b) (application filed on or after May 29, 2000)

The Patent Term Adjustment to date is 25 day(s). If the issue fee is paid on the date that is three months after the mailing date of this notice and the patent issues on the Tuesday before the date that is 28 weeks (six and a half months) after the mailing date of this notice, the Patent Term Adjustment will be 25 day(s).

If a Continued Prosecution Application (CPA) was filed in the above-identified application, the filing date that determines Patent Term Adjustment is the filing date of the most recent CPA.

Applicant will be able to obtain more detailed information by accessing the Patent Application Information Retrieval (PAIR) WEB site (<http://pair.uspto.gov>).

Any questions regarding the Patent Term Extension or Adjustment determination should be directed to the Office of Patent Legal Administration at (571)-272-7702. Questions relating to issue and publication fee payments should be directed to the Customer Service Center of the Office of Patent Publication at 1-(888)-786-0101 or (571)-272-4200.

Notice of Allowability**Application No.**

10/689,547

Applicant(s)

CROCKER ET AL.

Examiner

John Ruggles

Art Unit

1795

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to RCE amendment 7/14/09.
2. ☒ The allowed claim(s) is/are 1-2,7-13,19-23,25,29-41,44-46, and 98-99.
3. ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some* c) ☐ None of the:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

* Certified copies not received: _____.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.

THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

4. ☐ A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.
5. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
(a) ☐ including changes required by the Notice of Draftsperson's Patent Drawing Review (PTO-948) attached
1) ☐ hereto or 2) ☐ to Paper No./Mail Date _____.
(b) ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date _____.
Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).
6. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

1. ☐ Notice of References Cited (PTO-892)
2. ☐ Notice of Draftperson's Patent Drawing Review (PTO-948)
3. ☐ Information Disclosure Statements (PTO/SB/08),
Paper No./Mail Date _____
4. ☐ Examiner's Comment Regarding Requirement for Deposit of Biological Material
5. ☐ Notice of Informal Patent Application
6. ☐ Interview Summary (PTO-413),
Paper No./Mail Date _____
7. ☒ Examiner's Amendment/Comment
8. ☐ Examiner's Statement of Reasons for Allowance
9. ☐ Other _____.

/John Ruggles/
Examiner, Art Unit 1795

/Mark F. Huff/
Supervisory Patent Examiner, Art Unit 1795

EXAMINER'S AMENDMENT

An examiner's amendment to the record appears below. Should the changes and/or additions be unacceptable to applicant, an amendment may be filed as provided by 37 CFR 1.312. To ensure consideration of such an amendment, it MUST be submitted no later than the payment of the issue fee.

Authorization for this examiner's amendment was given in a telephone interview with J. Steven Rutt on 8/20/09 (as previously discussed on 8/19/09).

IN THE CLAIMS:

At claim 1 line 1, abbreviated as *claim 1/L1*, change "additive mask repair" to --additive ~~mask repair of a phase shift mask~~--.

At *claim 1/L3*, change "mask" to --~~phase shift mask~~ having a phase shifter--.

At *claim 1/L5*, change "additive repair" to --~~the~~ additive repair--.

At *claim 1/L6*, change "sol-gel material" to --sol-gel material for repair of the phase shifter on the phase shift mask, and--.

At *claim 1/L7-8*, change "converting the deposited material to a solid oxide which has transparency and index of refraction adapted for the defective mask in need of repair" to --converting the deposited sol-gel material to a solid ~~oxide~~ oxide, which has optical transparency and index of refraction adapted for the additive repair of the phase shifter on the defective phase shift mask in need of repair--.

At *claim 2/L1*, change "defective mask comprises" to --defective phase shift mask further comprises--.

Cancel claims 3 and 17-18.

At LI in each of claims 7-12, change “defective mask” to --defective phase shift mask--.

At claim 7/L2, change “clear defect” to --clear defect in the phase shifter--.

At L2 in each of claim 8-12, change “opening” ... “the material” to --opening in the phase shifter-- ... --the sol-gel material--.

At claim 13/L1, change “the mask” to --the defective phase shift mask--.

At claim 13/L2, change “dimension which is repaired” to --dimension which that is repaired in the phase shifter--.

At LI in each of claims 19-23 and 29, change “the material” to --the sol-gel material--.

At claim 25/L1-2, change “the material is a metal oxide or glass, or precursors thereof” to --the ~~material~~ solid oxide is a metal oxide or glass[[,]] ~~or precursors thereof~~--.

At claim 30/L1-2, change “the material has similar optical properties to the pattern” to --the ~~material~~ solid oxide has similar optical properties to the ~~pattern~~ phase shifter--.

At LI in each of claims 31-33, change “the adding step” to --the adding step additive repair--.

At claim 32/L1-2, change “the same material” to --the same sol-gel material--.

At claim 33/L1-2, change “different materials” to --different sol-gel material[[s]]--.

At claim 34/L1-2, change “converting step comprises external heating” to --converting step to form the solid oxide ~~comprises external~~ comprises external heating--.

At claim 35/L1, change “depositing step” to --depositing step of the sol-gel material--.

At claim 36/L2, change “defective mask” to --defective phase shift mask--.

At *claim 40/L2*, change “mask” to --defective phase shift mask having a phase shifter--.

At *claim 40/L3*, change “additive repair of the mask” to --the additive repair of the mask phase shifter--.

At *claim 40/L4*, change “the mask so that the compound is applied to the mask” to --the phase shift mask so that the patterning compound is applied to the mask phase shifter--.

At *claim 40/L5*, change “sol-gel material, and converting the sol-gel material to a solid oxide which” to --sol-gel material for repair of the phase shifter on the phase shift mask, and converting the sol-gel material to a solid oxide oxide, which--.

At *claim 40/L6*, change “adapted for the mask in need of additive repair” to --adapted for the additive repair of the phase shifter on the phase shift mask in need of additive repair--.

At *claim 41/L1*, change “the tip” to --the scanning probe microscope tip--.

At *claim 45/L2*, change “multilayer structure” to --repaired multilayer phase shifter structure--.

At *claim 46/L2*, change “the mask” to --the defective phase shift mask--.

At *claim 98/L1*, change “depositing step” to --depositing step of the sol-gel material--.

At *claim 98/L2*, change “the tip and defective mask” to --the atomic force microscope tip and the defective phase shift mask--.

At *claim 99/L2*, change “the tip and the mask” to --the scanning probe microscope tip and the defective phase shift mask--.

IN THE SPECIFICATION:

Amend the *title* as follows: --METHODS FOR ADDITIVE REPAIR OF PHASE SHIFT MASKS BY SELECTIVELY DEPOSITING NANOMETER-SCALE ENGINEERED STRUCTURES ON DEFECTIVE PHASE SHIFTERS[[,]] METHODS AND APPARATUS FOR FABRICATION THEREOF, AND APPLICATIONS TO MASK REPAIR, ENHANCEMENT, AND FABRICATIONS--.

Amend the *abstract* as follows: --Photomask repair and fabrication with use of direct-write nanolithography, including use of scanning probe microscopic tips (e.g., atomic force microscope tips, etc.) for deposition of ink materials including sol-gel ~~and metallic inks~~. Additive methods can be combined with subtractive methods. Holes can be filled with nanostructures. Heights of the nanostructures filling the holes can be controlled without losing control of the lateral dimensions of the nanostructures. ~~Chrome-on-Glass masks can be used and fabricated, as well as Phase shifters on~~ phase shifting masks (PSMs)~~and more advanced masks including masks for nanoimprint nanolithography~~ are additively repaired with selectively deposited sol-gel material that is converted to solid oxide, which has optical transparency and index of refraction adapted for the phase shifters repaired--.

Conclusion and Contact Information

Any inquiry concerning this communication or earlier communications from the examiner should be directed to JOHN RUGGLES whose telephone number is (571)272-1390. The examiner can normally be reached on Monday-Wednesday and alternate Fridays.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mark Huff can be reached on 571-272-1385. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Mark F. Huff/
Supervisory Patent Examiner, Art Unit 1795

/John Ruggles/
Examiner, Art Unit 1795